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SANDIA NATIONAL LABORATORIES

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

TECHNICAL PROCEDURE

TP-249

Maintenance, Verification, and Rejection Criteria of Instrumentation

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1.0 SCOPE

Sandia National Laboratories (SNL) is responsible for field experiments to monitor construction of the Exploratory Studies Facility (ESF) in support of the Yucca Mountain Site Characterization Project (YMP) and to characterize rock mechanics response. These experiments include installing and monitoring instrumentation that measures stress, displacement, temperature and other physical variables in the ESF.

This Technical Procedure (TP) defines the process for maintaining the instruments, verifying their function and performance, and rejecting instruments and erroneous data generated by malfunctioning instruments. This TP applies to all YMP SNL personnel and contractors who will be involved in SNL ESF experiments involving instrumentation.

2.0 ACTIVITY OBJECTIVE

The objective of this TP is to define procedures that facilitate the maintenance of installed instrumentation, provide for scheduled instrument evaluation by analysis of data to verify continuity of performance, provide criteria to evaluate gage function, correction of instrument problems identified in the data, and documentation of and removal of erroneous data.

3.0 RESPONSIBILITIES

The Principal Investigator (PI) has responsibility for ensuring that all information obtained in the ESF is in accordance with SNL's Quality Assurance Implementing Procedures (QAIPs) and that all individuals installing data collection instrumentation and wiring are properly trained.

Training will be conducted and documented by the PI or PI designee for this particular procedure.

4.0 QUALIFICATION PREREQUISITES

The PI or PI designee will verify that personnel using this TP have met the following prerequisites:

- Read this TP and meet the proficiency requirements by demonstration to the PI or PI designee.
- The most current version of this TP is being used.
- Equipment has a current calibration, if applicable.

5.0 INSTRUMENT MAINTENANCE SCHEDULE

Instrument maintenance includes all activities related to scheduled examination of output data for the purpose of assuring function and quality of the data and any activity involved in repair or replacement and recalibration of instruments discovered to be malfunctioning.

5.1 Instrument Maintenance/Repair Schedule

All instruments will undergo some kind of maintenance. Instrument maintenance may be limited to a review of the data plots by the PI or PI designee or may be as extensive as full

replacement of the instrument. The extent of the instrument maintenance will be dependent upon scheduling, room access, instrument access, or test status. The type and extent of instrument maintenance is at the discretion of the PI or PI designee.

Each instrument station or test will be scheduled for preventive instrument maintenance approximately every six weeks or as requested by the PI or PI designee.

Tape extensometers, extensometers, thermocouples or other temperature sensors, stressmeters, heat flux, humidity, remote closure, air velocity, acoustic emissions, pressure, flow, and oxygen sensors are examples of instruments that will be maintained.

Instrument maintenance is not limited to these gage types and will include additional gage types as they come on-line.

A master schedule for maintenance of installed instrumentation will be maintained by the PI or PI designee. This schedule will include methods to prompt the PI to assign maintenance activities and track performance of the required maintenance. The task leader (TL) will review instrument maintenance activities on a quarterly schedule.

5.2 Instrument Maintenance Procedures

Instrument maintenance will be performed using the following process:

1. Obtain plots of the data and listing of the data for the appropriate instrument(s) for the period of performance being examined.
2. Review the data and plots with regard to both established rejection criteria and threshold criteria for the particular instruments. These criteria may include:
 - a — gage within linear range or specified operating range
 - b — data trends/gage behavior consistent with expectations
 - c — comparison to previous measurements
 - d — presence of alarm flags for malfunction indicators in data output tables
 - e — presence of alarm flags for threshold indicators in data output tables.
3. Complete the Instrument Maintenance Record (Appendix A):
 - a — if the maintenance review does not indicate any problems, only the review date, reviewer, and instrument identifiers need to be entered on the form
 - b — if any rejection criteria or threshold criteria are met, the conditions must be documented by appending the data report/plots and appropriate explanations to the maintenance report.
4. Transmit the maintenance report to the PI or PI designee for signature approval. Any maintenance report that has detected conditions that satisfy rejection criteria or threshold criteria will be brought to the attention of the PI or PI designee as soon as possible.

5. If the maintenance report indicates conditions that satisfy rejection criteria or threshold criteria, the PI or PI designee will review the maintenance report and take the appropriate action which may include:
 - a — inform appropriate personnel/organizations within YMP in the case of threshold criteria
 - b — initiate physical inspection of the instrumentation
 - c — schedule further maintenance observation
 - d — schedule physical maintenance and replacement.

5.3 Control of Instrument Maintenance

A tickler file or similar system will be developed to assure that maintenance activities are conducted. The PI or PI designee will be responsible for assigning instrument maintenance activities. Instrument maintenance will be tracked by the PI or PI designee to verify instrument performance for data traceability.

A second tickler file or equivalent system will be maintained to track activities when conditions that satisfy rejection criteria or threshold criteria have been identified. The TL will be responsible to track actions to replace, repair, or recalibrate malfunctioning instruments where data is determined to exceed rejection criteria or threshold criteria.

5.4 Repair or Replacement of Instruments

The PI will identify instruments to be repaired or replaced and assign the action. The action will be documented on the Instrument Repair or Replacement Record (Appendix B).

Prior to initiating the repair, any baseline reference measure that can be made to preserve the data trend should be made.

After the repair/replacement, new baseline zero measurements are made using manual reading instruments and through the data logger equipment.

5.5 Adjustment of Data Records

Adjustments to data records are controlled by other TPs.

6.0 RECORDS

Records and record packages, including corrections and changes thereto, generated as a result of implementing this procedure shall be prepared and submitted as lifetime QA records (QA:L) in accordance with QAIP 17-1 "Creating, Protecting and Processing CRWM Records." QA records generated in following this TP include:

- Documentation of proficiency training.
- Maintenance records.
- Instrument repair or replacement records.

7.0 REFERENCES

QAIP 12-1, “Measuring and Test Equipment Control,” Sandia National Laboratories, Albuquerque, NM.

QAIP 17-1, “Creating, Protecting, and Processing CRWM Records,” Sandia National Laboratories, Albuquerque, NM.

8.0 APPENDICES

Appendix A. Instrument Maintenance Record (1 page)

Appendix B. Instrument Repair or Replacement Record (1 page)

Instrument Maintenance Record

(TP-249, Rev.01, Appendix A)

LOCATION: _____

DATE: _____

PERFORMED BY: _____

INSTRUMENTS:

Type	SNL ID No.
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

RESULTS:

YES

NO

G

G

Rejection criteria activated; If yes, attach further records

G

G

Threshold criteria activated; If yes, attach further records

PI Reviewed: _____

Date: _____

Instrument Repair or Replacement Record

(TP-249, Rev.01, Appendix B)

LOCATION: _____ **DATE:** _____

REPAIRED/REPLACED BY: _____

INSTRUMENT NUMBER(S):

DESCRIPTION OF ACTIVITIES:

BASELINE READINGS:

		SNL #	
Manual Reference	Initial	_____	_____
	Final	_____	_____
		_____	_____
		_____	_____
Instrument Output		_____	_____
		_____	_____
		_____	_____
		_____	_____